

of chlorine dioxide. However, the present composition is not a chlorite but rather a complex of the carbonate or bicarbonate and the chlorine dioxide and is free from chlorine. Whereas, the object of using these peroxy compounds in chlorite solutions is to insure against the presence of ClO_2 in the solution, the solution of the present invention contains ClO_2 as its active ingredient and does not contain chlorite. Thus, when the solution of Example 3 is dried only a sodium carbonate residue is left, the gaseous ClO_2 and water being driven off. No sodium chlorite is in the residue. On the other hand, when a sodium chlorite solution containing hydrogen peroxide is dried, the residue is sodium chlorite. With a sodium chlorite solution containing hydrogen peroxide and sodium carbonate or sodium percarbonate, the residue resulting from drying also contains sodium chlorite. Also, oxalic acid which changes color when brought into contact with chlorine or chlorite but not chlorine dioxide does not change color when added to the composition of the present invention.

It is pointed out that the use of hydrogen peroxide or active oxygen alone does not increase the maximum stable concentration of chlorine dioxide in solution but that the carbonate or bicarbonate or some other basic alkali metal salt of an inorganic acid containing oxygen but not chlorine must also be present.

It is also pointed out that if there is any chlorine (which is present in the reaction mix generated by reacting chlorate and acid to form chlorine dioxide and which is always present in commercial chlorite solutions) in the ClO_2 solutions of the present invention they cannot be stabilized. Evidently, under such conditions, the active oxygen does not tie the chlorine dioxide to the basic salt. In the present case, a pure ClO_2 is stripped from the generated reaction mixture and is added to water together with the carbonate and hydrogen peroxide so that there is no chlorine or chlorite present.

It is known to add hydrogen peroxide and other peroxy compounds such as percarbonates to the chlorate-acid reactors in generating ClO_2 or to the reaction mix to suppress the rate of evolution of the chlorine dioxide but this does not give the advantages of the present invention because of the presence of reaction products other than chlorine dioxide, e.g. chlorine, chloric and chlorous acids and chlorate, any or all of which prevent stabilization by the percarbonate. The chlorine dioxide gas is usually stripped from such reaction mix and added to water in which case the percarbonate is left behind or the chlorine

dioxide is generated at the place where it is to be used and the generated reaction mix used immediately, as such, e.g. a bleach bath, so that stabilization is not a problem.

Although certain theories and examples have been set forth above, the invention is not limited thereto or thereby but only to the compositions and methods recited in the following claims and their equivalents.

I claim:

1. A method of making a stable chlorine dioxide solution comprising adding separately to water (1) a source of active oxygen selected from the group consisting of ozone, hydrogen peroxide, calcium, magnesium, sodium and urea peroxide and alkali metal perborate, persulfate and perphosphate and (2) a salt of the group consisting of alkali metal carbonate and bicarbonate and alkali metal borate, sulfate and phosphate, and (3) chlorine dioxide gas substantially free from chlorine, said chlorine dioxide gas being added by bubbling it through said solution, the amount of active oxygen in said source being substantially less than 0.2 part by weight per part of said salt.

2. A method according to claim 1, said salt being selected from the group consisting of sodium carbonate and bicarbonate.

3. A method according to claim 2, the source of said active oxygen comprising hydrogen peroxide.

4. A method according to claim 2, the source of said active oxygen comprising ozone.

5. A method according to claim 1, said salt compound, said source of free oxygen and said chlorine dioxide being separately added to said water simultaneously and gradually over an extended period at substantially uniform rates.

6. A method according to claim 1, the amount of active oxygen in said source being not substantially less than 0.1 part by weight per part of said salt.

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